

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Patrick Muffo on 5/20/2010.

The application has been amended as follows:

Claim 61 (currently amended): A non-transitory computer readable medium that stores a program that makes a computer for control of an exposure apparatus that performs an exposure processing of a specific process to each of photosensitive objects in a plurality of lots execute a predetermined processing, the program making the computer execute:

a procedure of, with respect to a first lot in the specific process,

calculating an estimate value of positional information of each of a plurality of divided areas on a photosensitive object, which is used to align each of the plurality of divided areas with a predetermined point, by a statistical computation using actual measurement values of positional information of a plurality of specific divided areas selected from the plurality of divided areas on the photosensitive object,

creating correction information used to correct a non-linear component of positional deviation amount of each of the plurality of divided areas from an individual fiducial position based on the actual measurement values of positional information of the plurality of specific divided areas and on the estimate value, and

performing exposure while controlling a position of the photosensitive object based on the estimate value of positional information of each of the plurality of divided areas and on the correction information; and

a procedure of, with respect to every (K-I) lot of second and subsequent lots in the specific process, for a plurality of measurement divided areas on the photosensitive object that include at least the plurality of specific divided areas,

calculating a non-linear component of positional deviation amount of each of the measurement divided areas from an individual fiducial position based on an actual measurement value of positional information of each of the measurement divided areas and on the estimate value,

updating the correction information as needed in accordance with a magnitude of one of the calculated non-linear component of positional deviation amount of each of the measurement divided areas and a variation amount of the component within a threshold, but not updating the correction information with respect to the remaining lots, and

performing exposure while controlling the position of the photosensitive object based on the estimate value of positional information of each of the plurality of divided areas and on the correction information that is latest,

wherein the K is an integer not less than 2.

Allowable Subject Matter

2. Claims 31, 33-35, 37-39, 42-44, 49-52, 54-57, and 61 are allowed.
3. The following is an examiner's statement of reasons for allowance:

Regarding claims 31, 50, and 61, the prior art of record, either alone or in combination, fails to teach or render obvious an exposure apparatus and method for exposing multiple lots under a specific process by calculating an estimate value of position of multiple shots on a wafer by using a statistical computation using actual measurement values of positional information for a number of specific shots selected from the shots on the wafer and creating correction information used to correct a non-linear component of positional deviation of each of the shots based on an actual measurement value of positional information of the measured shots and on the corresponding measurement value, and updating the correction information as needed in accordance with a magnitude of one of a calculated non-linear component of deviation amount of the measured shots and a variation amount of the non-linear component within a threshold but not updating the correction amount with respect to the remaining lots for multiple lots processed. These limitations in combination with the other limitations of claims 31, 50, and 61 render the claims non-obvious over the prior art of record.

The dependent claims are likewise allowable by virtue of their dependency upon allowable independent claims as stated above.

Kikuchi (US PGPub 2002/0042664) describes calculating an estimate value of positional information for shots on a wafer (para. [0185] and step 310 of Fig. 5) and creating correction information to correct a non-linear component of the positions of the shots (Fig. 5, step 312). However, Kikuchi does not disclose updating the correction information as needed.

Upon further consideration, Tomimatu (US Patent No. 6,338,925) discloses updating information as needed (Fig. 3, step 22, the obsolescence of data is used to determine whether to update information for further processing of lots), but does not disclose not updating the correction information with respect to the remaining lots since once the parameters are updated and stored for one m-th lot, the non-obsolete parameter values are used until obsolescence is again detected (Fig. 3, steps 28-Fig. 4, step 42).

Further, Irie et al. (US Patent No. 5,808,910) discloses calculating a magnitude of non-linear error (Fig. 11, step 206, 210, and 211, the absolute value of the calculated non-linear error is compared to a predetermined value), but Irie does not disclose updating the correction information in accordance with a magnitude of one of the non-linear component of each shot and a variation amount of the non-linear component within a threshold, but not updating the information for the remaining lots.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Irie et al. (US Patent No. 5,596,204) discloses updating parameter values for a second wafer based on non-linear error vectors for the first wafer.

Magome et al. (US Patent No. 5,805,866) discloses calculating non-linear components during EGA alignment.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Riddle whose telephone number is (571)270-7538. The examiner can normally be reached on Monday- Thursday 7:00-17:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571)272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2882

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Peter B. Kim/
Primary Examiner, Art Unit 2882

/C. R./
Examiner, Art Unit 2882